

Bronchial stenosis secondary to lung adenocarcinoma

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Background

Lung adenocarcinoma is a common type of cancer, with signs sometimes visible on chest x-rays.

Case presentation

A 66-year-old male smoker presented with coughing. Chest x-rays were ordered, showing multiple signs of bronchial stenosis, adenopathy, and a lung nodule. These findings were correlated with a chest CT-exam and PET-CT, with biopsy confirming the diagnosis.

Conclusion

This case demonstrates multimodal correlation of adenocarcinoma signs visible on chest x-rays, in particular bronchial stenosis.

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Lung adenocarcinoma is the most common type of lung cancer, with over 220 000 new cases in 2015, and the most common cause of cancer death.¹ Due to its non-specific symptoms, chest x-rays are often requested for these patients.² Therefore, the ability to detect this pathology on initial chest x-rays is essential in guiding follow-up exams. Although signs on chest x-rays are often subtle and non-specific, they can be an essential first step in making the diagnosis. As the symptoms are often late to present, an early radiological diagnosis is crucial.³ This case demonstrates the correlation between X-ray, CT and PET-CT findings in a 66-year-old smoker presenting with a cough in whom lung cancer was suspected on an initial chest X-ray.

CASE REPORT

A 66-year-old male smoker presented with cough, resulting in a chest x-ray being ordered. The postero-anterior chest X-ray revealed a thickening of the right laterotracheal stripe and a right hilar opacity. The lateral chest X-ray showed a narrowing of the right intermediate bronchus alongside a thickening of its posterior wall (Figure 1). Furthermore, an opacity was found overlaying the spine (spine sign). A follow-up non-contrast CT-exam was ordered, revealing the cause of the thickening of the laterotracheal stripe and the thickening of the posterior wall to be due to hilar lymphadenopathy, causing bronchial constriction (Figure 2, 3, 4). The

opacity overlaying the spine was found to be a lung nodule found in the superior segment of the right lower lobe. A PET-CT scan was performed to search for metastases, hypermetabolic lymph nodes were found in the supraclavicular and mediastinal regions alongside a liver metastasis (Figure 5 and 6). A percutaneous transthoracic biopsy of the lung nodule was performed, with anatomopathology discovering histological diagnosis of an adenocarcinoma with 60% PDL1 expression, confirming the diagnosis of stage IV lung adenocarcinoma. The patient is currently undergoing treatment.

DISCUSSION

Lung adenocarcinoma is the most common primary pulmonary cancer in the United states, being classed as a non-small cell lung cancer.¹ In Belgium, lung cancer represents the third most common cause of cancer, with an incidence of 98 per 100,000 and 57 per 100,000 in 2020 in men and women respectively.⁴ Despite a strong association with smoking it is also the most common cancer in non-smokers, representing around 40% of all cancers.¹ When lung cancers become symptomatic, most patients present with coughing, shortness of breath, chest pain, recurring infections or haemoptysis.³

Adenocarcinomas frequently present on imaging as nodules or masses within the lung parenchyma, but can also appear as an opacity producing a

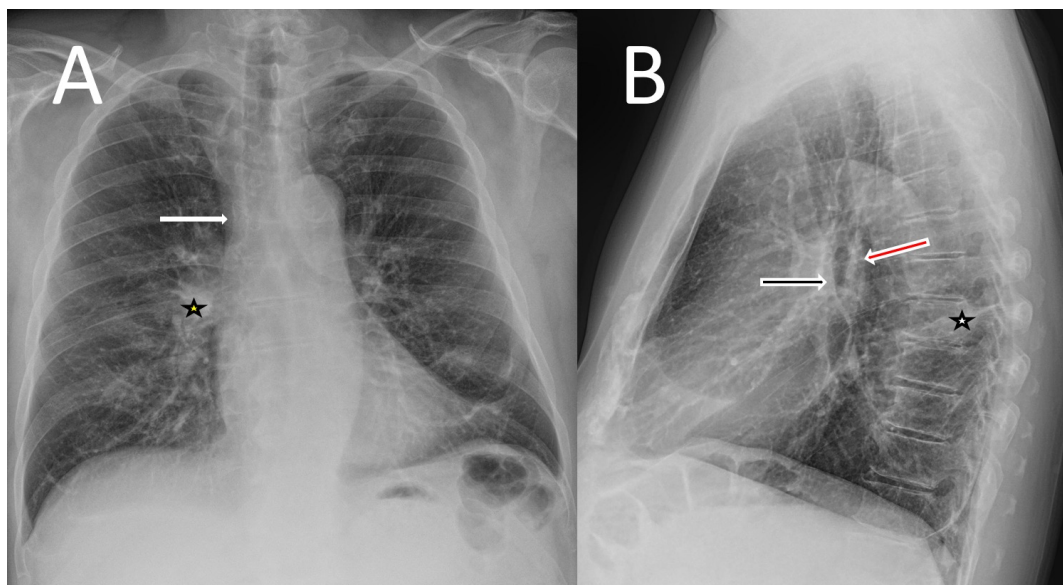


Figure 1 Postero-anterior chest x-ray (A) showing a right hilar opacity corresponding to a lymph node (yellow star) and a thickening of the right laterotracheal stripe (white arrow). The lateral chest x-ray (B) demonstrates narrowing of the right intermedium bronchus (black arrow) alongside thickening of its posterior wall (red arrow). The primary cancer appears as a nodule overlaying the spine (white star).

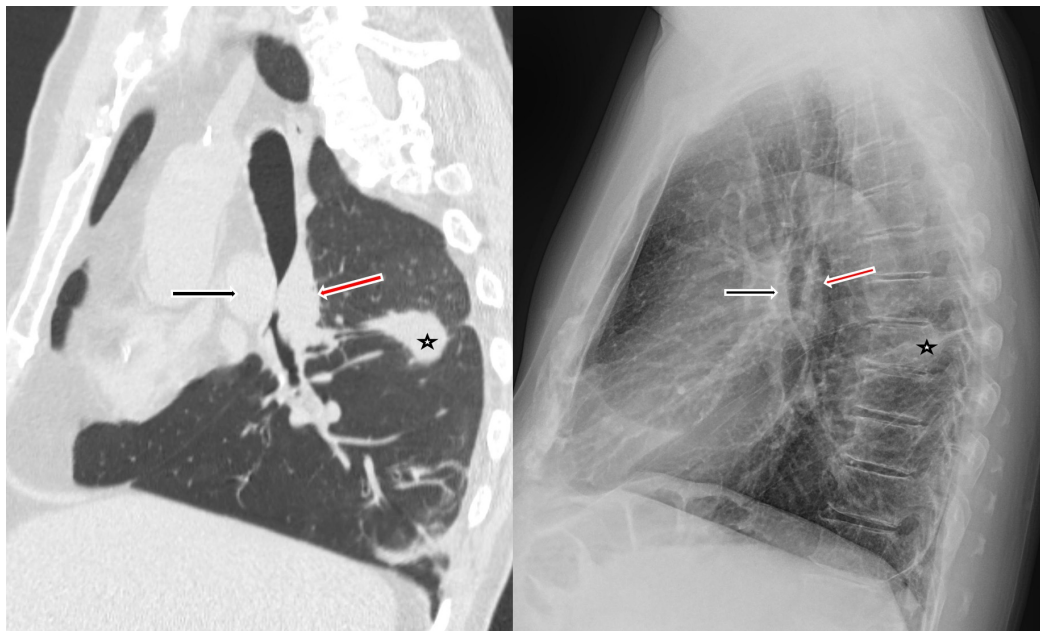


Figure 2 Juxtaposition of the lateral chest-ray and a sagittal CT image showing right intermediate bronchus constriction between a lymph node (black arrow) anteriorly infiltration of its posterior wall (red arrow), demonstrating modality correlation. The nodule is also visible (white star).

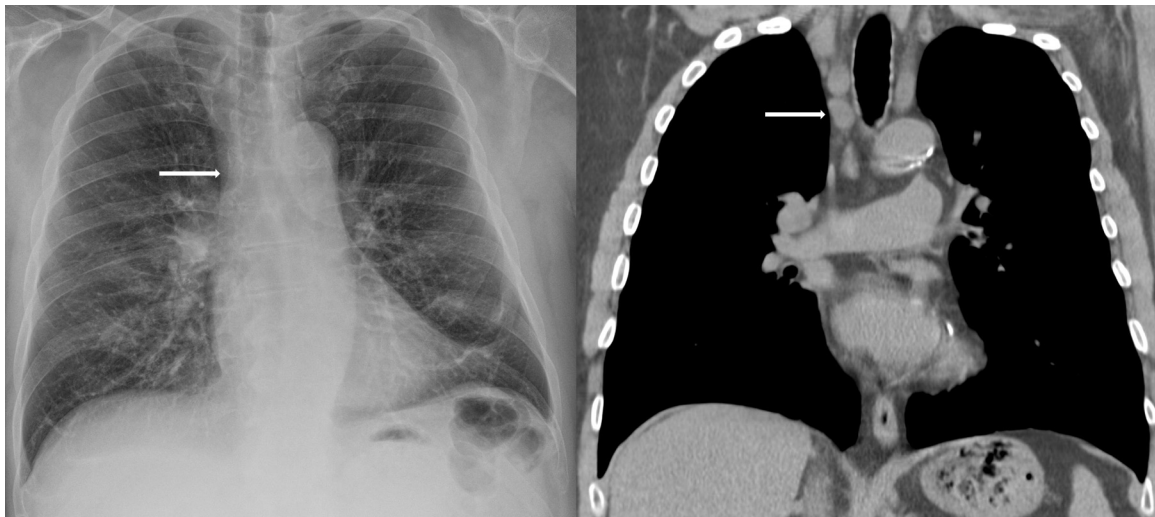


Figure 3 Juxtaposition of the postero-anterior chest x-ray and a coronal CT image showing the correlation of hilar lymphadenopathy (yellow star) between the two modalities.

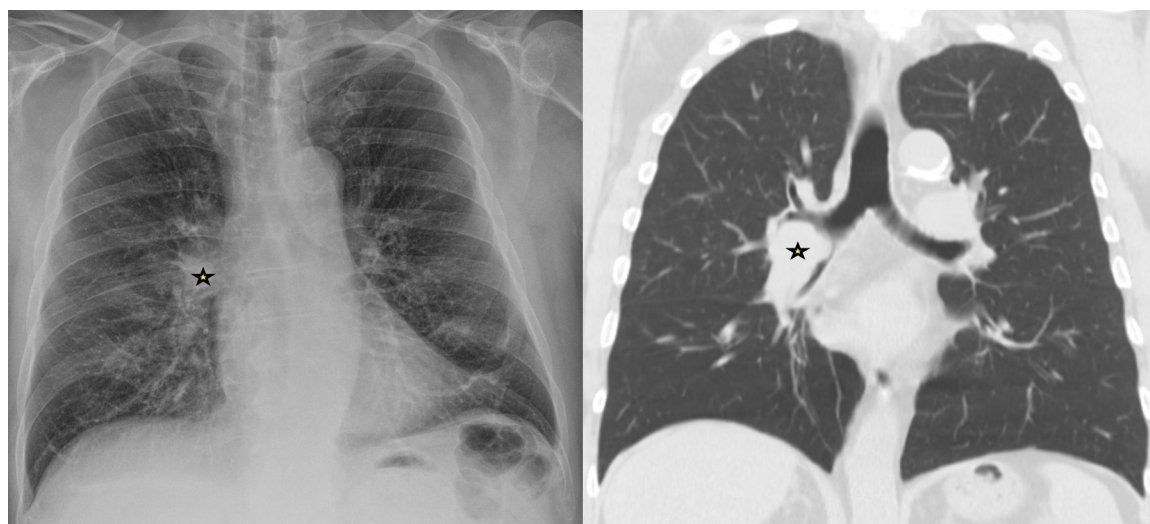


Figure 2 Juxtaposition of the postero-anterior chest x-ray and a coronal CT image showing the correlation of right laterotracheal stripe thickening (white star) between the two modalities.

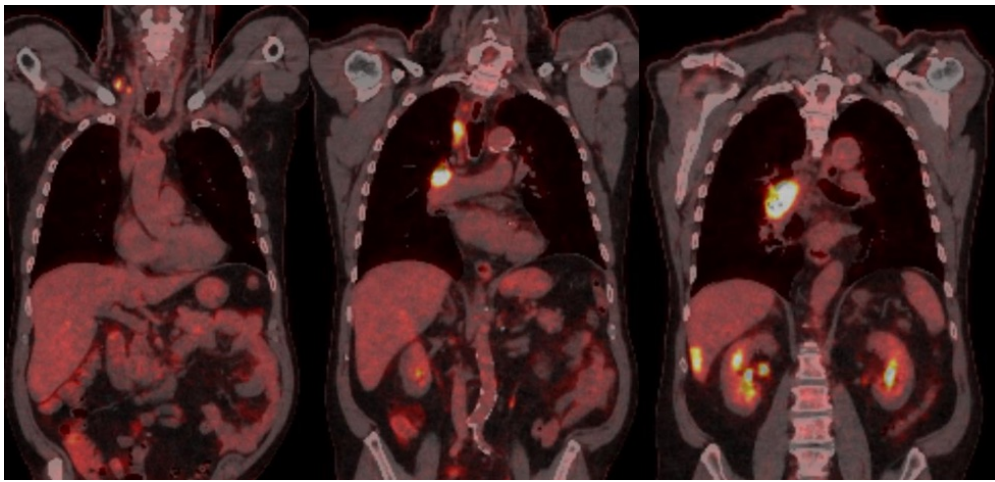


Figure 5 Axial fusion image of CT and PET-CT showing zones of high activity both anterior and posterior to the right intermediate bronchus

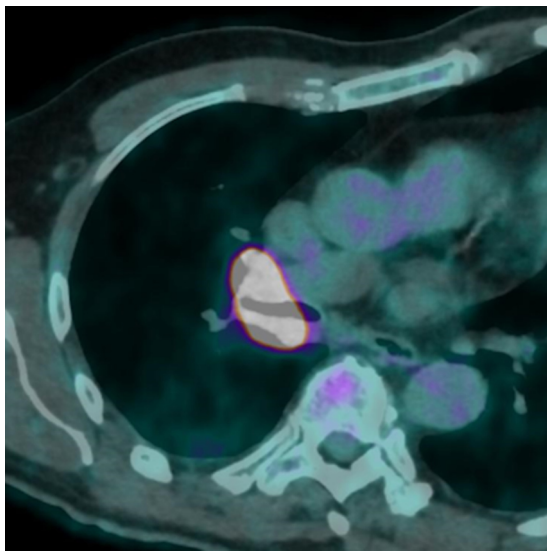


Figure 6 Coronal PET-CT images demonstrating high activity of the supraclavicular lymphadenopathies, liver metastasis and mediastinal lymphadenopathies and lesions

consolidation of an entire lobe or lung.³ This tumour often metastasises, particularly to the liver, bone, central nervous system, adrenal glands or the same or contralateral lung.³ When imaged using CT-exams, lung adenocarcinoma can present as ground-glass nodules or consolidations with a ground-glass halo.³ If mediastinal lymph nodes are involved they may be seen on chest x-rays as mediastinal enlargement or hilar masses, as seen here.³ Our patient had both a lung nodule overlaying the spine, the spine sign, and mediastinal enlargement. Furthermore, one can see the stenosis of the right intermediate bronchus due to it being encircled by enlarged hilar lymph nodes, causing extrinsic compression, accompanied by tumoral infiltration of the bronchial wall. Although extrinsic central airway obstruction was common, reported in 20-30% of lung cancer cases, modern lung cancers have shifted to

favouring peripheral development.⁵ A recent study of lung cancer patients showed that around 13% of their patients had signs of central airway obstruction on their baseline CT-exam.⁵ The phenomenon of tumour-related airway obstruction is classed into extrinsic, intrinsic or mixed depending on the aetiology.⁵ Of the patients that develop central airway obstruction a third will die of asphyxia, haemoptysis or post-op obstructive pneumonia.⁵

The treatment of airway stenosis can involve bronchoscopic treatments, for which the best candidates are lesions less than a centimetre, without extra-cartilaginous invasion.² For the 20-30% of patients with central airway obstruction, the bronchoscopic tools that can be used will depend on the mechanism of the stenosis.² For intraluminal lesions, mechanical debulking, as well as thermal techniques can be attempted amongst others.^{2,6} For extrinsic compressions, airway stenting is used.² However, as interventional bronchoscopy is not without risk, it is only indicated in symptomatic cases with viable tissue downstream of the lesion.²

The treatment of bronchial stenosis is essential, even in a palliative setting, due to the fact that it may stave off imminent suffocation, as well as severe dyspnoea.⁶ This is essential to improve the quality of life of the patients as well as possibly providing extra time for additional therapy to take effect.⁶

CONCLUSION

Lung adenocarcinomas are common and frequently fatal. Chest x-rays, often the first exam patients will undergo, can show signs of adenocarcinoma, allowing follow-up exams. This case demonstrates multiple x-ray signs, with their CT and PET-CT correlations.

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